



# First report of a '*Candidatus Phytoplasma solani*' isolate affecting *Sophora alopecuroides* in Iran

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**Received:** 20 May 2014. **Published:** 03 Nov 2014. **Keywords:** P1/P7, fu5/ru3, nested-PCR, phytoplasma

*Sophora alopecuroides* (Sophora root) is one of several herbaceous species of Fabaceae, native to southeast Europe, southern Asia, Australasia, Pacific Islands, Western South America and Puerto Rico that possesses medicinal properties. However, in many areas of Iran it is regarded as a rather notorious weed species requiring control. In September 2012, symptoms of leaf yellowing, little leaf and stunting were observed on *S. alopecuroides* plants in the suburb of Firooz-kuh, Tehran province (Fig. 1).

Total DNA was isolated from the leaf midrib and stem tissues of six symptom-bearing (Fig. 1a) and two symptomless plants (Fig. 1b) using the CTAB extraction method (Maixner *et al.*, 1995) and DNeasy Plant Mini kit (Qiagen, UK). Total DNA was used as template in a nested-PCR with phytoplasma universal 16S rDNA primers P1/P7 in the first PCR round, and fU5/rU3 in the nested reaction (Duduk *et al.*, 2013). PCR amplicons of expected size (approx. 850 bp) were obtained from all six samples of symptom-bearing plants but not from the symptomless plants. The PCR products were purified and directly sequenced. Sequences were compared to those of the reference phytoplasmas present in GenBank using BLAST, and subjected to phylogeny analysis using the neighbour-joining method of MEGA 5.0 software (Tamura *et al.*, 2011). The fU5/rU3 sequences (GenBank Accession No. KF263685, KF374706) were 99% identical to each other, and exhibited 99% of sequence identity with those of phytoplasmas of the 16SrXII group '*Candidatus Phytoplasma solani*'. The phytoplasma identified from *S. alopecuroides* in Firooz-kuh, Iran, clustered with isolates of 16SrXII, subgroup A (16SrXII-A) (Fig. 2).

Previous reports of 16SrXII phytoplasma affecting *Sophora* species include that associated with *S. japonicum* yellows (Duduk *et al.*, 2010) in China. Other phytoplasmas have been identified in *S. japonicum* including '*Ca. phytoplasma ziziphi*' in China, associated with witches' broom, and a 16SrI phytoplasma '*Ca. Phytoplasma asteris*' associated with *Sophora* root yellows (Yu *et al.*, 2012; Chen *et al.*, 2013). These results suggest that *S.*

*alopecuroides* may be a potential secondary host for the 16SrXII phytoplasma, which could rapidly spread within the Tehran province. To our knowledge this is the first report of a '*Ca. Phytoplasma solani*' isolate affecting *S. alopecuroides* in Firooz-kuh, Iran.

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Figure 1

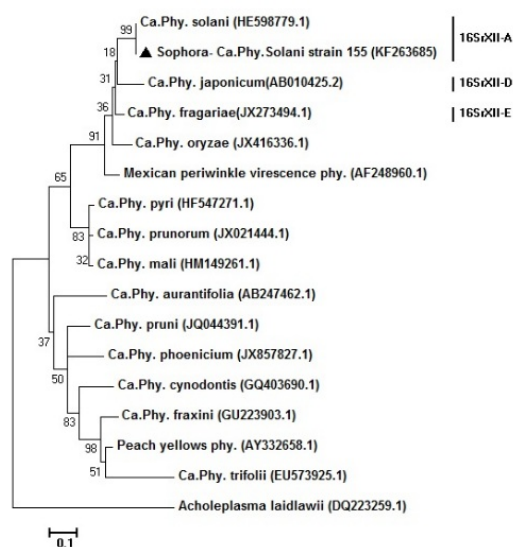


Figure 2

**To cite this report:** Allahverdi T, Rahimian H, Babaeizad V, 2014. First report of a '*Candidatus Phytoplasma solani*' isolate affecting *Sophora alopecuroides* in Iran. *New Disease Reports* **30**, 22. <http://dx.doi.org/10.5197/j.2044-0588.2014.030.022>

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